"ROTOR FOR COOLING PUMPS, IN PARTICULAR FOR MARINE ENGINES AND RELEVANT MANUFACTURING PROCESS

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This invention proposes a rotor for cooling pumps, in particular for marine engine pumps and the relevant manufacturing process.

More particularly the rotor according to the invention, which comprises a core to be keyed on a shaft connected with engine means and a plurality of radial tabs in a flexible material, is characterized in that said core and said tabs are both made of rubber or a similar material having different hardness.

More specifically the core is made of ebonized rubber, in particular a mixture of neoprene, nitrile, PVC and Kevlar®.

It is obtained a rotor which combines the features of the toughness distinguishing the rotors with a metallic core with those of lightness and wearproof distinguishing the rotors in synthetic material.

The invention fits into the sector of the cooling pumps of the type used on marine engines.

Generally these pumps comprise a rotor provided with a plurality of radial tabs, of flexible material, eccentrically assembled inside a chamber and put in rotation around its own axis.

The rotors of this type, known at present, are substantially divided into two typologies: those with a metallic core and those with a core in synthetic material.

In the rotors with metallic core the outer portion of the rotor body and its tabs are of flexible material, generally neoprene, injected on a core

customarily made of brass, consisting of a substantially annular body having a scot for mounting it on a shaft connected with engine means.

With this type of rotor inconveniences often take place due to the corrosion and wear to which the metal is subject, when it comes in contact with the salty water and other polluting substances.

To avoid this inconvenience, rotors have been developed wherein the core consists of a cage of synthetic material, in particular nylon, charged with glass fiber, a core on which the outer portion in neoprene is then injected.

This second solution shows however the inconvenience of a remarkable brittleness with the consequent ease of breakage of the said rotor.

In the sector it is felt the need of a rotor which combines the features of lightness and wearproof of the rotors provided with a nylon core, but which results as strong and resistant as the rotors provided with a metallic core.

This problem is now solved by this invention, which proposes a rotor and the relevant manufacturing method, wherein both the core and the tabs are of rubber, but with different hardness, in particular with the core in ebonized and bakelized rubber, consisting of a mixture of neoprene, nitrile, PVC and aramidic fiber such as the Kevlar®.

This invention will be now described in detail, by way of a not limitative example, with reference to the enclosed figures; in which:

- figure 1 shows the section of a rotor according to the invention along a plane perpendicular to the axis of the rotor;
- figure 2 is the section along the line A-A of figure 1.

With reference to the enclosed figures, the rotor according to the invention essentially comprises a core 1 onto which a body 2 is fitted in, provided

with a plurality of tabs 3 of flexible material.

The core 1, which is addressed to be assembled on a shaft connected with engine means, shows a through hole 4 provided internally with a toothing 5 or another known system able to constrain under rotation the core and the shaft onto which the core is assembled.

The body 2 is preferably injected directly on the core and the tabs 3 show preferably the ends 6 which are addressed to flow in contact with the pump chamber walls, swollen for example with a substantially cylindrical outline.

A feature of this invention consists in that the core 1 and the body 2 with the tabs 3 are both made of rubber, but with different hardness.

Many tests carried out by the applicant in search of a material which combined the toughness distinguishing the metallic cores with the features of lightness and wearproof distinguishing the synthetic materials, allowed to notice that an optimum material for this purpose consists of a mixture comprising at least neoprene, nitrile, PVC and aramidic fiber.

These materials preferably enter into the mixtures in the following proportions, where the different components are expressed in weight:

Polychloroprene	30% to 50%
Acrylonitrile + PVC	50% to 80%
Aramidic Fiber	30% to 50%
Silica	30% to 50%
Resin	30% to 50%
Zinc oxide	30% to 50%
Sulphur	30% to 50%

It must be observed that the sum of the minimum indicated percentages is higher than 100%, because in the field of the rubber it is usual to distinguish between the rubber components (in this case polychloroprene and acrylonitrile + PVC) and the other components, and to indicate the amount of these other components referred to 100 parts of rubber instead of the total amount.

More preferably, the materials enter in the mixture in the proportions indicated hereunder, where all the percentages are referred to the total amount.

Polychloroprene	25%
Acrylonitrile + PVC	25%
Aramidic Fiber	3%
Silica	13,4%
Resin	23%
Zinc oxide	3,5%
Sulphur	7,1%

The body 2 with the tabs 3 can on the contrary be made integrally of neoprene (CR) or other polymers, as the case may be.

The manufacture takes place in the following way.

The material addressed to realize the core is first injected inside a mould, wherein a punch is inserted having the same form of the shaft onto which the rotor has to be assembled.

Once the material is consolidated, the core is extracted, cooled, dressed with an adhering chemical agent and afterwards inserted into the mould of the rotor, always by mounting it on a support having the same sizes of the

pump shaft.

Then the neoprene is injected and forms the body with the tabs.

When the vulcanisation is ended, the rotor can be extracted from the mould and after a stabilisation period it can be assembled on the pump.

The rotor thus obtained, in addition to combine, as already told, the advantageous features of the rotors with a metallic core and those in synthetic material, does not require a particular process of finishing and results therefore to be of a more moderate cost.

A skilled in the art can then provide for different changes and variations, which have anyway to be everyone comprised within this invention.